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[1] R. Agrawal and R. Srikant. **Mining sequential patterns.** In ICDE 95, pages 3-14, Taipei, Taiwan, Mar. 1995. [2] J. Ayres, J. Flannick, J. Gehrke, ... www.siam.org/meetings/sdm03/proceedings/sdm03\_36.pdf - [Similar pages](#)

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Conventional **sequential pattern mining** work on relational databases can be found in the classic work by Srikant and **Agrawal** [1][9]. ...  
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### 1 Poster papers: Sequential PAttern mining using a bitmap representation

Jay Ayres, Jason Flannick, Johannes Gehrke, Tomi Yiu

**July 2002 Proceedings of the eighth ACM SIGKDD international conference on Knowledge discovery and data mining**
**Publisher:** ACM PressFull text available: [pdf\(639.47 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We introduce a new algorithm for mining sequential patterns. Our algorithm is especially efficient when the sequential patterns in the database are very long. We introduce a novel *depth-first* search strategy that integrates a depth-first traversal of the search space with effective pruning mechanisms. Our implementation of the search strategy combines a vertical bitmap representation of the database with efficient support counting. A salient feature of our algorithm is that it incrementall ...

### 2 DB-3 (databases): data mining: Scalable sequential pattern mining for biological sequences

Ke Wang, Yabo Xu, Jeffrey Xu Yu

**November 2004 Proceedings of the thirteenth ACM international conference on Information and knowledge management CIKM '04**
**Publisher:** ACM PressFull text available: [pdf\(237.01 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Biosequences typically have a small alphabet, a long length, and patterns containing gaps (i.e., "don't care") of arbitrary size. Mining frequent patterns in such sequences faces a different type of explosion than in transaction sequences primarily motivated in market-basket analysis. In this paper, we study how this explosion affects the classic sequential pattern mining, and present a scalable two-phase algorithm to deal with this new explosion. The <i>Segment Phase</i> first search ...

**Keywords:** algorithm, bioinformatics, frequent pattern, pruning technique, sequence, sequential pattern

3

### Research track posters: IncSpan: incremental mining of sequential patterns in large database

Hong Cheng, Xifeng Yan, Jiawei Han  
August 2004 **Proceedings of the tenth ACM SIGKDD international conference on Knowledge discovery and data mining KDD '04**

Publisher: ACM Press

Full text available: [pdf\(150.79 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Many real life sequence databases grow incrementally. It is undesirable to mine sequential patterns from scratch each time when a small set of sequences grow, or when some new sequences are added into the database. Incremental algorithm should be developed for sequential pattern mining so that mining can be adapted to incremental database updates. However, it is nontrivial to mine sequential patterns incrementally, especially when the existing sequences grow incrementally because such growth may ...

**Keywords:** buffering pattern, incremental mining, reverse pattern matching, shared projection

#### 4 Mining block correlations to improve storage performance

Zhenmin Li, Zhifeng Chen, Yuanyuan Zhou  
May 2005 **ACM Transactions on Storage (TOS)**, Volume 1 Issue 2

Publisher: ACM Press

Full text available: [pdf\(1.02 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Block correlations are common semantic patterns in storage systems. They can be exploited for improving the effectiveness of storage caching, prefetching, data layout, and disk scheduling. Unfortunately, information about block correlations is unavailable at the storage system level. Previous approaches for discovering file correlations in file systems do not scale well enough for discovering block correlations in storage systems. In this article, we propose two algorithms, *C-Miner* and ...

**Keywords:** Storage management, block correlations, file system management, mining methods and algorithms

#### 5 Research track: On computing, storing and querying frequent patterns

Guimei Liu, Hongjun Lu, Wenwu Lou, Jeffrey Xu Yu  
August 2003 **Proceedings of the ninth ACM SIGKDD international conference on Knowledge discovery and data mining**

Publisher: ACM Press

Full text available: [pdf\(195.56 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Extensive efforts have been devoted to developing efficient algorithms for mining frequent patterns. However, frequent pattern mining remains a time-consuming process, especially for very large datasets. It is therefore desirable to adopt a "mining once and using many times" strategy. Unfortunately, there has been little work reported on managing and organizing a large set of patterns for future use. In this paper, we propose a disk-based data structure, CFP-tree (Condensed Frequent Pattern Tree) ...

**Keywords:** data mining and data warehousing, frequent pattern mining

#### 6 Research track: Fast vertical mining using diffsets

Mohammed J. Zaki, Karam Gouda  
August 2003 **Proceedings of the ninth ACM SIGKDD international conference on Knowledge discovery and data mining**

Publisher: ACM Press

Full text available:  pdf(228.14 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

A number of vertical mining algorithms have been proposed recently for association mining, which have shown to be very effective and usually outperform horizontal approaches. The main advantage of the vertical format is support for fast frequency counting via intersection operations on transaction ids (tids) and automatic pruning of irrelevant data. The main problem with these approaches is when intermediate results of vertical tid lists become too large for memory, thus affecting the algorithm ...

**Keywords:** association rule mining, diffsets, frequent itemsets

## 7 Data mining (DM): A new algorithm for gap constrained sequence mining

 Salvatore Orlando, Raffaele Perego, Claudio Silvestri

March 2004 **Proceedings of the 2004 ACM symposium on Applied computing**

**Publisher:** ACM Press

Full text available:  pdf(287.50 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The sequence mining problem consists in finding frequent sequential patterns in a database of time-stamped events. Several application domains require limiting the maximum temporal gap between events occurring in the input sequences. However pushing down such constraint is critical for most sequence mining algorithms. In this paper we describe CCSM (Cache-based Constrained Sequence Miner), a new level-wise algorithm that overcomes the troubles usually related to this kind of constraints. CCSM ado ...

**Keywords:** constraints, intersection, sequence mining, sequential patterns, vertical dataset

## 8 Web services and performance evaluation: Indexing web access-logs for pattern queries

 Alexandros Nanopoulos, Yannis Manolopoulos, Maciej Zakrzewicz, Tadeusz Morzy

November 2002 **Proceedings of the 4th international workshop on Web information and data management**

**Publisher:** ACM Press

Full text available:  pdf(187.24 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this paper, we develop a new indexing method for large web access-logs. We are concerned with pattern queries, which advocate the search for access sequences that contain certain query patterns. This kind of queries find applications in processing web-log mining results (e.g., finding typical/atypical access-sequences). The proposed method focuses on scalability to web-logs' sizes. For this reason, we examine the gains due to signature-trees, which can further improve the scalability to very ...

## 9 User trails: Improving adaptation in web-based educational hypermedia by means of knowledge discovery

 Andrej Krištofič, Mária Bieliková

September 2005 **Proceedings of the sixteenth ACM conference on Hypertext and hypermedia HYPERTEXT '05**

**Publisher:** ACM Press

Full text available:  pdf(519.13 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Most adaptive web-based hypermedia systems adapt presentation of the content and/or navigation using predefined set of rules. Considering different behavior and preferences of each user it may be hard to generalize and construct all appropriate rules in advance. This

problem is more noticeable in educational adaptive hypermedia systems, where adaptation to individual learning style of a student is important for the student to effectively assess particular domain. In this paper we present techniq ...

**Keywords:** adaptive navigation, adaptive web-based educational hypermedia, concept recommendation, knowledge discovery, usage patterns

**10 Frequent patterns II: Mining frequent item sets by opportunistic projection**

Junqiang Liu, Yunhe Pan, Ke Wang, Jiawei Han

July 2002 **Proceedings of the eighth ACM SIGKDD international conference on Knowledge discovery and data mining**

Publisher: ACM Press

Full text available:  pdf(864.90 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this paper, we present a novel algorithm Opportune Project for mining complete set of frequent item sets by projecting databases to grow a frequent item set tree. Our algorithm is fundamentally different from those proposed in the past in that it opportunistically chooses between two different structures, array-based or tree-based, to represent projected transaction subsets, and heuristically decides to build unfiltered pseudo projection or to make a filtered copy according to features of the ...

**Keywords:** association rules, frequent patterns

**11 Computing curricula 2001**

September 2001 **Journal on Educational Resources in Computing (JERIC)**

Publisher: ACM Press

Full text available:  pdf(613.63 KB)  html(2.78 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**12 High performance data mining (tutorial PM-3)**

Vipin Kumar, Mohammed Zaki

August 2000 **Tutorial notes of the sixth ACM SIGKDD international conference on Knowledge discovery and data mining**

Publisher: ACM Press

Full text available:  pdf(8.06 MB) Additional Information: [full citation](#), [references](#), [index terms](#)

**13 Discovering all most specific sentences**

Dimitrios Gunopulos, Roni Kharden, Heikki Mannila, Sanjeev Saluja, Hannu Toivonen, Ram Sewak Sharma

June 2003 **ACM Transactions on Database Systems (TODS)**, Volume 28 Issue 2

Publisher: ACM Press

Full text available:  pdf(283.09 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Data mining can be viewed, in many instances, as the task of computing a representation of a theory of a model or a database, in particular by finding a set of maximally specific sentences satisfying some property. We prove some hardness results that rule out simple approaches to solving the problem. The *a priori* algorithm is an algorithm that has been successfully applied to many instances of the problem. We analyze this algorithm, and prove that is optimal when the maximally specific sen ...

**Keywords:** Data mining, association rules, learning with membership queries, maximal frequent sets, minimal keys

- 14 Research sessions: implementation techniques: Implementing database operations using SIMD instructions 

Jingren Zhou, Kenneth A. Ross

June 2002 **Proceedings of the 2002 ACM SIGMOD international conference on Management of data SIGMOD '02**

Publisher: ACM Press

Full text available:  pdf(1.39 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Modern CPUs have instructions that allow basic operations to be performed on several data elements in parallel. These instructions are called SIMD instructions, since they apply a single instruction to multiple data elements. SIMD technology was initially built into commodity processors in order to accelerate the performance of multimedia applications. SIMD instructions provide new opportunities for database engine design and implementation. We study various kinds of operations in a database con ...

- 15 Frequent patterns I: DualMiner: a dual-pruning algorithm for itemsets with constraints 

 Cristian Bucila, Johannes Gehrke, Daniel Kifer, Walker White

July 2002 **Proceedings of the eighth ACM SIGKDD international conference on Knowledge discovery and data mining**

Publisher: ACM Press

Full text available:  pdf(1.22 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Constraint-based mining of itemsets for questions such as "find all frequent itemsets where the total price is at least \$50" has received much attention recently. Two classes of constraints, monotone and antimonotone, have been identified as very useful. There are algorithms that efficiently take advantage of either one of these two classes, but no previous algorithms can efficiently handle both types of constraints *simultaneously*. In this paper, we present the first algorithm (called Dua ...

- 16 Compiler-based I/O prefetching for out-of-core applications 

 Angela Demke Brown, Todd C. Mowry, Orran Krieger

May 2001 **ACM Transactions on Computer Systems (TOCS)**, Volume 19 Issue 2

Publisher: ACM Press

Full text available:  pdf(499.03 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

Current operating systems offer poor performance when a numeric application's working set does not fit in main memory. As a result, programmers who wish to solve "out-of-core" problems efficiently are typically faced with the onerous task of rewriting an application to use explicit I/O operations (e.g., read/write). In this paper, we propose and evaluate a fully automatic technique which liberates the programmer from this task, provides high performance, and requires only minima ...

**Keywords:** compiler optimization, prefetching, virtual memory

- 17 MIL primitives for querying a fragmented world 

Peter A. Boncz, Martin L. Kersten

October 1999 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 8 Issue 2

**Publisher:** Springer-Verlag New York, Inc.

Full text available: [!\[\]\(3d8c13c92b853674f749aac6fa869926\_img.jpg\) pdf\(261.36 KB\)](#) Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

In query-intensive database application areas, like decision support and data mining, systems that use vertical fragmentation have a significant performance advantage. In order to support relational or object oriented applications on top of such a fragmented data model, a flexible yet powerful intermediate language is needed. This problem has been successfully tackled in Monet, a modern extensible database kernel developed by our group. We focus on the design choices made in the Monet interprete ...

**Keywords:** Database systems, Main-memory techniques, Query languages, Query optimization, Vertical fragmentation

**18 Enabling scalable online personalization on the Web**

 Debra VanderMeer, Kaushik Dutta, Anindya Datta, Krithi Ramamritham, Shamkant B. Navathe

October 2000 **Proceedings of the 2nd ACM conference on Electronic commerce**

**Publisher:** ACM Press

Full text available: [!\[\]\(e1c624d4757f08486e89482c18364c17\_img.jpg\) pdf\(491.69 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** dynamic profiling, e-commerce, online personalization, user behavior

**19 An architecture to support scalable online personalization on the Web**

Anindya Datta, Kaushik Dutta, Debra VanderMeer, Krithi Ramamritham, Shamkant B. Navathe

August 2001 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 10 Issue 1

**Publisher:** Springer-Verlag New York, Inc.

Full text available: [!\[\]\(4146d17f71dced09c6ad789cacceaa6d\_img.jpg\) pdf\(167.25 KB\)](#) Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

Online personalization is of great interest to e-companies. Virtually all personalization technologies are based on the idea of storing as much historical customer session data as possible, and then querying the data store as customers navigate through a web site. The holy grail of online personalization is an environment where fine-grained, detailed historical session data can be queried based on current online navigation patterns for use in formulating real-time responses. Unfortunately, as mo ...

**Keywords:** Behavior-based personalization, Dynamic lookahead profile, Profile caching, Scalable online personalization, Web site and interaction model

**20 Bioinformatics (BIO): Incremental interactive mining of constrained association rules from biological annotation data with nominal features**

 Imad Rahal, Dongmei Ren, Amal Perera, Hassan Najadat, William Perrizo, Riad Rahhal, Willy Valdivia

March 2005 **Proceedings of the 2005 ACM symposium on Applied computing SAC '05**

**Publisher:** ACM Press

Full text available: [!\[\]\(98e0dd3c5f32ab687ab08e39ab3c4a93\_img.jpg\) pdf\(132.24 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Data arising from genomic and proteomic experiments is amassing at high speeds resulting in huge amounts of raw data; consequently, the need for analyzing such biological data --- the understanding of which is still lagging way behind --- has been prominently solicited in the post-genomic era we are currently witnessing. In this paper

we attempt to analyze annotated genome data by applying a very central data-mining technique known as association rule mining with the aim of discovering rules cap ...

**Keywords:** P-trees, association rule mining, bioinformatics, incremental, interactive, yeast genome

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